

**STATE OF NEW MEXICO  
ENVIRONMENTAL IMPROVEMENT BOARD**

**IN THE MATTER OF PROPOSED NEW REGULATION**  
20.2.50 NMAC – *Oil and Gas Sector – Ozone Precursor Pollutants*      No. EIB 21-27(R)

**THE NATIONAL PARK SERVICE’S  
PROPOSED STATEMENT OF REASONS AND CLOSING ARGUMENT**

**I. INTRODUCTION**

The National Park Service (“NPS”) hereby submits its proposed findings of fact, conclusions of law, final proposed amendments, and closing argument for the proposed new regulation 20.2.50 NMAC – *Oil and Gas Sector – Ozone Precursor Pollutants* (No. EIB 21-27 (R)). The NPS notes that it appreciates the New Mexico Environment Department’s (“NMED” or “the Department”) efforts in outreach and work throughout this complicated process as well as the opportunity to testify during the September 2021 hearing.

Under the New Mexico Air Quality Control Act, NMSA 1978, Section 74-2-5 requires that the Board adopt a plan, including this regulation, to ensure attainment and maintenance of the National Ambient Air Quality Standards (“NAAQS”) for ozone within areas of the State that have monitored ozone concentrations that exceed 95% of the NAAQS. This proposed regulation at Part 50 would reduce emissions of ozone precursor pollutants (oxides of nitrogen (“NO<sub>x</sub>”) and volatile organic compounds (“VOCs”) from sources in the oil and gas sector located in areas of the State within the Board’s jurisdiction that are experiencing elevated ozone levels. The NPS calls upon the Board to keep these overarching reduction goals in mind as it reviews materials and promulgates this regulation.

**II. FINDINGS OF FACT**

- *Ozone concentrations exceed the level of the ozone NAAQS at Carlsbad Caverns National Park*

While regional ozone control strategies have successfully decreased ozone levels in many parts of the U.S., the Carlsbad, NM area, including Carlsbad Caverns National Park (CAVE), has been struggling with degrading air quality. The current National Ambient Air Quality Standards (NAAQS) value for ozone is 70 parts per billion (ppb); the ozone design value is the annual 8-hr, 4th highest ozone value, averaged over 3-years. As shown in Table 1 for CAVE, which provides the year, number of exceedance days, ozone design value years, and the ozone design value for the corresponding 3-year period, the park has transitioned from having no ozone exceedance days to

regularly exceeding the NAAQS. In addition, the larger Carlsbad, NM area is on pace to being designated an ozone nonattainment area by the EPA.

*Table 1: Monitored Ozone Concentrations at CAVE (2014-2021)*

Year	# Exceedance Days	Years	8-hr 4 <sup>th</sup> High Ozone (ppb)	NAAQS (ppb)
2016	None	2014-2016	67	70
2017	None	2015-2017	66	70
2018	10	2016-2018	71	70
2019	6	2017-2019	74	70
2020	9	2018-2020	73	70
2021	15	2019-2021	74	70

- Modeling demonstrates oil and gas emissions are significant for ozone in New Mexico*

From the Department’s Exhibit 23<sup>1</sup>, modeling demonstrates that ozone design values have been increasing in Southern New Mexico since 2012 – 2016. If current design value concentrations are defined using 2017 – 2019 data, future year (2028) design values are predicted to exceed the 2015 ozone NAAQS in Carlsbad without additional oil and gas emissions reductions. Additionally, modeling shows that oil and gas emissions have a significant contribution to ozone both in terms of the future design value averages and episodic maximums. For comparison, in the Environmental Protection Agency’s Cross-State Air Pollution rulemaking process, a threshold equal to 1% of the ozone NAAQS (under 1 ppb) was used when determining whether a state significantly contributes to downwind ozone in a neighboring state. Oil and gas emissions are also found in the modeling to be a significant portion of New Mexico’s contribution to ozone.
- Carlsbad Caverns stands out as being heavily affected by oil and gas sources of all studied national parks for ozone formation*

A volatile organic compound (VOC) survey study conducted at CAVE in 2017 demonstrated large-scale contributions of VOCs from oil and gas emissions at the park and regionally<sup>2</sup>. While no ozone exceedances were measured at CAVE from 2013-2017, there were 10 ozone exceedance events in 2018, demonstrating the impact of increased oil and gas operations in the region. Additionally, this gave rise to concerns of elevated aerosol concentrations in the region that can affect human health and impair visibility. A second intensive air quality study was conducted at CAVE to better understand the factors driving both ozone and aerosol particle concentrations at the park. This 6-week study was conducted at CAVE by the NPS from July 24 through September 3 in 2019. The study included a comprehensive suite of gaseous and particulate measurements to provide a detailed characterization of pollutants and to aid in quantifying the air quality impacts from regional oil and gas operations. In addition

<sup>1</sup> NMED Exhibit 23: Revised 2014v2 Base Case, 2028 Base Case Modeling and 2028 NM O&G Control Strategy (Feb 2021) [Sundry Cloud Storage \(nm.gov\)](https://www.nm.gov/sundry-cloud-storage)

<sup>2</sup> Benedict, K.B., Prenni, A.J., El-Sayed, M.H., Hecobian, A., Zhou, Y., Gebhart, K.A., Sive, B.C., Schichtel, B.A., Collet, J.L., 2020. Volatile organic compounds and ozone at four national parks in the southwestern United States. Atmos. Environ. 239 <https://doi.org/10.1016/j.atmosenv.2020.117783>

to the comprehensive suite of instruments deployed at the park, whole air samples were collected throughout the region to provide information on the spatial distribution of VOCs.

It is well documented that oil and gas operations emit a wide range of VOCs and oxides of nitrogen ( $\text{NO}_x$ ). In particular, elevated levels of light alkanes ( $\text{C}_2\text{-C}_5$ ) are indicative of oil and gas emissions. Light alkanes measured at the park and throughout the region demonstrated conclusively that emissions from oil and gas operations in the Permian Basin are impacting CAVE, a Class I area afforded the highest level of air quality protection. During both the 2017 and 2019 studies at CAVE, light alkanes were the most abundant VOCs as has been observed in other oil and gas basins across the U.S. For CAVE, light alkane levels were elevated, on average, by approximately an order of magnitude above summertime regional background values. During pollution events at the park, it was not uncommon to see alkane levels that were more than two orders of magnitude over regional background levels, illustrating the persistence and magnitude of the impact of oil and gas emissions at CAVE. Additionally, alkyl nitrates, which can be used to estimate the “age” of air masses, provided insight regarding whether the emission sources impacting the park were local (young) or were transported from more distant sources outside of the region (old). For CAVE, the air mass ages were typically young, particularly during episodic pollution events, indicating that the emissions were from local sources. In addition, the mix of total nitrogen compounds ( $\text{NO}_y$  to  $\text{NO}_x$ ) can also provide insight on emission source origins. In CAVE, the mix of total nitrogen compounds clearly indicates nearby sources of  $\text{NO}_x$  as the dominant contributor to ozone formation. Monitoring information shows increasing  $\text{NO}_x$  concentrations in the region along with upward trends in ozone. Current information indicates that  $\text{NO}_x$  emission reductions will be necessary to curb ozone production.

Correlations between the types of VOC compounds were used to identify both the magnitude and persistence of oil and gas operation emission influences on CAVE’s air quality. For example, all alkanes were highly correlated with oil and gas emissions, indicating that oil and gas operations were the major contributor to VOC levels in the atmosphere. Also, the ratio of iso-pentane to n-pentane can be used to fingerprint VOC emission sources. This ratio typically ranges from roughly 2 to 4 for fuel evaporation and combustion emissions throughout the U.S. A ratio of less than one indicates an area is influenced by oil and gas operations. For CAVE, these values were about 0.85 in 2017 and 0.83 in 2019, conclusively demonstrating that oil and gas operations are impacting air quality at the park and in the region.

In summary, the combined effect of increased  $\text{NO}_x$  and VOC levels, and the corresponding increasing ozone levels throughout the region (Table 1) illustrate that oil and gas operations are significantly impacting the air quality at CAVE. To mitigate the effects of these emissions and their ultimate impacts on both human health and natural resources, a combined strategy of reducing both  $\text{NO}_x$  and VOC emissions is necessary.

### III. CONCLUSIONS OF LAW AND FINAL PROPOSED AMENDMENTS

The NPS reviewed engine and turbine limits included in state rules across the country. Based on this review, we suggest that slightly more stringent standards and revised definitions are feasible for engines and turbines. These standards are a necessary starting point given the NO<sub>x</sub> contribution of these sources and the contribution of oil and gas emissions to air quality issues in New Mexico. Initially, the NPS proposed limits similar to those currently required by Pennsylvania as part of their general permit program for oil and gas sources except for the proposed limit for existing large (>60,000 bhp) turbines. These limits are in Pennsylvania's proposed RACT III requirements.

We continue to encourage additional standards for smaller engines and turbines as well as stricter standards for larger engines shown in NPS Exhibit D as comprehensive NO<sub>x</sub> reduction measures may be necessary to address ongoing ozone issues. However, we understand the scope of this rulemaking was limited to engines > 500 – 1,000 bhp and turbines ≥ 1,000 bhp depending on the application. We also recognize that this rulemaking proposes the first engine and turbine standards for these types of equipment in New Mexico. If the more stringent standards for smaller engines will not be considered at this time, we offer alternative amendments in lieu of those originally recommended by the NPS. For the purposes of this rulemaking, our amendments apply to the engines and turbine standard tables. We comment that the 4-stroke lean-burn engine NO<sub>x</sub> standards currently proposed at 2.0 g per bhp-hr should be changed to 1.2 g per bhp-hr in Table 1, shown in NPS Exhibit F. This is based on Colorado's recent engine rulemaking for the similar engines and size that is presented as NMED Exhibit 39<sup>3</sup>. We also comment that the "constructed, reconstructed, and installed" language be reinstated in both Tables 1 and 2 of the regulation.

### IV. CONCLUSION

The measures proposed in this rule are a necessary step to help reduce high ozone concentrations. However, additional and more stringent measures will be necessary to reduce emissions sufficiently to get below the ozone NAAQS. NO<sub>x</sub> control measures are essential to be included with VOC control requirements. The NPS wishes again to thank NMED and the Board for their efforts on this complex regulation to protect air quality in New Mexico. It is imperative that you ensure the goals of this rulemaking and that our national parks and visitors in New Mexico experience improved air quality in the future.

Respectfully submitted on this 20<sup>th</sup> day of January 2022,  
National Park Service

By: /s/ Lisa Devore  
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<sup>3</sup> Colorado Air Quality Control Commission Regulation 7: [5-CCR-1001-9\\_eff-013022.pdf - Google Drive](#)

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## CERTIFICATE OF SERVICE

I hereby certify that on January 20, 2022, a true and correct copy of the foregoing *National Park Service's Proposed Statement of Reasons and Closing Argument* was served via electronic mail to the following:

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